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EXAMINER	
MILORD, MARCEAU	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/034,386	Applicant(s) SHATTIL, STEVE J.	
	Examiner Marceau Milord	Art Unit 2682	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17 and 18* is/are allowed.

6)☒ Claim(s) *1-16 and 19-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-16, 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Proakis et al (US Patent No 5844951) in view of Thomas et al (US Patent No 6141393) and Agee (US Patent No 6128276).

Regarding claim 1, Proakis et al discloses a method for using frequency diversity (figs. 1 and 3) to spatial demultiplex a plurality of interfering signals comprising: providing for transformation of an input signal that includes the plurality of interfering signals into a plurality of spectral components, the spectral components having complex amplitudes corresponding to unique complex amplitude-versus-frequency profiles for each of the interfering signals (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the steps of providing for computation of a set of weights with respect to the complex amplitude-versus frequency profiles,

providing for application of said weights to said spectral components, and providing for combining across the weighted spectral components to cancel co-channel interference.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (figs. 1, 7-9;col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The basic system may be extended to include multi-element antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the

effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit weights to be used in any subsequent return transmission. In general, the desperado weights including adaptive antenna arrays that improve the quality and capability of the signal transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Regarding claim 2, Proakis et al as modified discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals, wherein the input signal includes samples of at least one of a set of signals including a spread-spectrum signal, a multi-carrier signal, code division multiple access signal, a discreet-time signal, and a continuous-time signal (col. 2, line 45- col. 3, line 66; col. 12, line 3- col. 13, line 46).

Regarding claim 3, Proakis et al as modified discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals, wherein step of transforming the discreet-time input signal into the plurality of spectral components includes decoding at least one multi-carrier signal in the input signal, the multi-carrier signal characterized by a plurality of carriers each having a different spreading code (col. 12, line 43- col. 13, line 46; col. 15, line 38- col. 16, line 58).

Regarding claim 4, Proakis et al discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals comprising: providing for transformation of a discreet-time input signal into a plurality of spectral components, the discreet-time input signal including the plurality of interfering signals, the spectral components having differences in either or both amplitude variations and phase variations (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the steps of providing for separation of the interfering signals by processing either or both the amplitude variations and the phase variations across the plurality of spectral components.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined

basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The basic system may be extended to include multi-element antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit

weights to be used in any subsequent return transmission. In general, the desperado weights including adaptive antenna arrays that improve the quality and capability of the signal transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Regarding claim 5, Proakis et al as modified discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals, wherein the step of providing for separation of the interfering signals includes a constellation processing method (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

Regarding claim 6, Proakis et al as modified discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals, wherein the step of providing, for transformation of a discreet-time input signal includes deriving at least one discreet-time input signal from a plurality of received signals, the received signals being transmitted signals that have propagated in a free-space or guided-wave environment after being transmitted by a plurality of transmitters (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

Regarding claim 7, Proakis et al discloses a method of using complex amplitude (figs. 1 and 3) versus diversity parameter values to perform spatial demultiplexing of interfering signals comprising: providing for transformation of a receive signal into a plurality of non-special

diversity components, the receive signal including a plurality of the interfering signals (col. 2, line 45- col. 3, line 66; col. 15, line 20- col. 16, line 61).

However, Proakis et al does not specifically disclose the features of the non-special diversity components having differences in either or both amplitude distributions and phase distributions, and providing for separation of the interfering signals by processing either or both the amplitude variations and the phase variations across the plurality of non-special diversity components.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The basic system may be extended to include multi-element antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit weights to be used in any subsequent return transmission. In general, the desperado weights including adaptive antenna arrays that improve the quality and capability of the signal transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Regarding claim 8, Proakis et al as modified discloses a method of using complex amplitude versus diversity parameter values to perform spatial demultiplexing of interfering signals, wherein the step of providing for transformation includes polarization processing and the diversity components include polarization-diversity components (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

Regarding claim 9, Proakis et al as modified discloses a method of using complex amplitude versus diversity parameter values to perform spatial demultiplexing of interfering signal, further comprising providing for adjusting at least one spatial gain distribution of at least one of the received signals (col. 2, line 45- col. 3, line 66).

Regarding claim 10, Proakis et al as modified discloses a method of using complex amplitude versus diversity parameter values to perform spatial demultiplexing of interfering signals, wherein the step of adjusting spatial gain distributions includes adjusting spatial gain distribution characteristics of at least one of a plurality of transmitted signals (col. 2, line 45- col. 3, line 66;col. 15, line 20- col. 16, line 61).

Regarding claims 11-12, Proakis et al discloses an apparatus capable of spatially separating a plurality of interfering information-bearing received signals, each of the received signals having a different amplitude-versus-frequency profile, the apparatus including: at least one diversity receiver adapted to separate the received signals into a plurality of frequency components, and at least one frequency -domain spatial interferometer demultiplexer adapted to provide frequency-domain processing to the plurality of frequency components to separate at least one information signal from at least one interfering signal (col. 2, line 45- col. 3, line 66;col. 15, line 20- col. 16, line 61).

However, Proakis et al does not specifically disclose the features of a combining unit adapted to provide weighting and combining of the plurality of received signals using the generated plurality of weights to enhance signal to interference of at least one of the received signal by canceling interfering signals.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The basic system may be extended to include multi-element antenna array nulling methods for

interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit weights to be used in any subsequent return transmission. In general, the desperado weights including adaptive antenna arrays that improve the quality and capability of the signal transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Regarding claim 13, Proakis et al discloses a method of producing (figs. 1 and 3) diversity-encoded spread-spectrum signals comprising: providing for generation of at least one wideband electromagnetic signal, providing for impressing an information signal onto the at least

one wideband signal to produce at least one spread-spectrum signal (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the steps of providing for a correlation process at a receiver to correlate the plurality of spread-spectrum signals for recovering the information signal.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The

basic system may be extended to include multi-element antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit weights to be used in any subsequent return transmission. In general, the desperado weights including adaptive antenna arrays that improve the quality and capability of the signal transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Regarding claim 14, Proakis et al as modified discloses a method of producing diversity-encoded spread-spectrum signals, wherein the step of providing for diversity encoding includes

at least one item of a set of providing a time offset, polarizing, applying a predetermined directionality, transmitting from a plurality of spatially separated transmitters, modulating with a predetermined carrier frequency, combining with a carrier having a predetermined mode, and transmitting the spread-spectrum signals in at least one predetermined subspace channel (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

Regarding claim 15, Proakis et al discloses a method of producing diversity-encoded spread-spectrum signals comprising: providing for generating at least one information-bearing wideband radio signal, providing for generating at least one decoding signal (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the steps of providing for generating at least one decoding signal for correlating with the at least one information-bearing wideband radio signal at a receiver to recover at least one information signal, and providing for diversity-encoding of at least one of the information-bearing wideband signal and the decoding signal.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a

method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The basic system may be extended to include multi-element antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit weights to be used in any subsequent return transmission. In general, the desperado weights including adaptive antenna arrays that improve the quality and capability of the signal

transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Regarding claim 16, Proakis et al as modified discloses a method of producing diversity-encoded spread-spectrum signals, wherein the step of providing for diversity encoding includes at least one item of a set of providing a time offset, polarizing, applying a predetermined directionality, transmitting from a plurality of spatially separated transmitters, modulating with a predetermined carrier frequency, combining with a carrier having a predetermined mode, and transmitting the signals in at least one predetermined subspace channel (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

Regarding claim 19, Proakis et al discloses a spread-spectrum receiver capable of extracting an information signal from a plurality of diversity coded spread-spectrum radio signals, the receiver comprising: a receiving system adapted to receive the diversity-coded spread-spectrum signals, a diversity processor coupled to the receiving system, the diversity processor adapted to diversity decode at least one of the received signals to provide a plurality of signals that are highly correlated (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the features of a signal correlator coupled to the diversity processor, the signal correlator adapted to correlate the plurality of highly correlated signals to generate a correlation signal indicative of the information signal.

adapted at least one diversity-coded signal with the at least one dispreading signal to generate a correlation signal indicative of the information signal.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The basic system may be extended to include multi-element antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the

effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit weights to be used in any subsequent return transmission. In general, the despreader weights including adaptive antenna arrays that improve the quality and capability of the signal transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Regarding claim 20, Proakis et al discloses a spread-spectrum receiver (figs. 1 and 3) capable of extracting an information signal from at least one diversity coded spread-spectrum radio signal, the receiver comprising, a receiving system adapted to receive, the at least one diversity-coded signal and at least one dispreading signal, the dispreading signal being separable

from the at least one diversity-coded signal, a diversity processor coupled to the receiving system (col. 2, line 45- col. 3, line 66; col. 15, line 20- col. 16, line 61).

However, Proakis et al does not specifically disclose the features of a diversity processor adapted to diversity decode at least one of the least one diversity-coded signal and the at least one dispreading signal, and a signal correlator coupled to the diversity processor, the signal correlator adapted to correlate the at least one diversity-coded signal with the at least one dispreading signal to generate a correlation signal indicative of the information signal.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The basic system may be extended to include multi-element antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit weights to be used in any subsequent return transmission. In general, the desperado weights including adaptive antenna arrays that improve the quality and capability of the signal transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Regarding claim 21, Proakis et al discloses a receiver capable of receiving and separating a plurality of information signals, the receiver including: a sampler adapted to sample received information signals to produce at least one algebraically unique combination of information signals (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the features of a nonlinear processor adapted to apply a nonlinear process to at least one signal of the algebraically unique combination of information signals to increase the number of combinations, and a multi-user detector adapted to provide information about at least one of the information signals in order to calculate at least one information-signal value.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired

transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67).

Agee also discloses a code nulling method, which is included interference cancellation and enhanced signal separation by exploiting the spectral diversity of the various sources. The basic system may be extended to include multi-element antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation (col. 3, line 21- col. 4, line 62). Furthermore, the spreading gain output has the ability to compensate for the effects of the intervening radio communication environment, both channel distortion and co-channel interference. The optimum spreading gain outputs that should generated at any time can be fixed, or adjusted based on the results obtained from some sort of measurement related to the communication quality, reverse channel data. The spreading code provides for the compensation for co-channel interference sources, as well as channel distortion. In addition, a dispreading weight generator is connected to control the individual in phase and quadrature amplifiers of each channel. The dispreading weights are adapted to maximize the signal to interference and noise ratio of the dispread message sequence, and to introduce directivity and retro-directivity. (col. 11, line 1- col. 12, line 58). The combiner weights are used to construct a set of transmit weights to be used in any subsequent return transmission. In general, the desperado weights including adaptive antenna arrays that improve the quality and capability of the signal transmission and reception operation (col. 15, line 1- col. 16, line 67; col. 23, line 7- col. 24, line 59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Agee to the modified system of Thomas and Proakis in order to provide an effective means for implementing retro directive antenna arrays by

reducing co-channel interference, and minimizing channel variation between the reception and transmission paths.

Allowable Subject Matter

2. Claims 17-18 are allowed.

Response to Arguments

3. Applicant's arguments with respect to claims 1- 16, 19-21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marceau Milord whose telephone number is 703-306-3023. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian C. Chin can be reached on 703-308-6739. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MARCEAU MILORD

Marceau Milord
Examiner
Art Unit 2682

MARCEAU MILORD
PRIMARY EXAMINER

12-30-04